AI-enabled Preventive Grid Analytics

Fault Detection & Location

Preventive Analysis

Improved Grid Reliability and Safety
IWOS: Line Sensor + Concentrator + AI Analytics Platform

System Components

Line Sensor
- Compatible with 50Hz/60Hz grids
- High precision current measurement: 0~630A, ±0.5%
- High sampling rate of oscillography waveforms: 12.8KHz (256 samples/cycle)
- Zero-sequence current synthesis enabled by 20μs precision sync
- Power optimization operation
  - Full-function mode: all functions including waveform recording enabled; powered by line and supercapacitor
  - Low-power mode: waveform recording disabled; powered by line and battery
- Power harvesting: 1A to support full-function mode; supercapacitor backs for 12h
- IP67, water proof
- Light weight: <1.5kg, live installation and removal

Concentrator
- WAN: LTE/AMI/LoRa
- Field Area Network: RF
- High-Precision (1us) GPS for location and time synchronization
- Zero-sequence current synthesis enabled by 20μs precision sync
- Main and backup power: solar, maintenance-free capacitor
- IP55 protection
- Remote upgrade & maintenance

AI Analytics Platform
- Sensor and concentrator management
- GIS-based real-time monitoring of line status and events
- Deep learning analytic system
  - Oscillography waveform classification powered by AI algorithms
  - Accurate fault location and SMS alarms
  - Preventive analysis and early warning
- Flow Direction & Load Analysis
  - Reports
    - Load trend & statistics
    - Power quality analysis
    - Fault statistics

World’s #1 Deployment

Line Sensors Deployed: 120,000+
Power Lines Covered: 11,000+
Power Line Events & Waveform Data: 28 Million+
Line Faults Detected: 35,000+

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Models
- Ground Fault
- Short Circuit Fault
- Inrush Current
- Lightning
- Power Restore
- Power Outage
- Other Events
- Preventive Alerts

Wireless Sensor
- 4G LTE/AMI/LoRa
- Pole-mounted
- Line-mounted

AI Analytics Platform
- Email/SMS/Mobile APP
- Neural Networks
- Machine Learning
- Big Data
- Machine Learning
- Big Data
# Model Nomenclature

## IWOS Line Sensor

<table>
<thead>
<tr>
<th>Overhead Line Sensor Model</th>
<th>Model code: IWO-C-&lt;C/U/M/S&gt;&lt;5/6&gt;&lt;A/L&gt;</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IWO-C-&lt;C/U/M/S&gt;&lt;5/6&gt;&lt;A/L&gt;</td>
<td>Short-range Frequency: C: 470-510MHz, U: 915-928MHz, M: 866MHz, S: 919-923MHz</td>
<td>When the Concentrator needs to support 3 groups of line sensors: Phase-A: IWO-C1/C4/C7-&lt;C/U/M/S&gt;&lt;5/6&gt;&lt;A/L&gt;; Phase-B: IWO-C2/C5/C8-&lt;C/U/M/S&gt;&lt;5/6&gt;&lt;A/L&gt;; Phase-C: IWO-C3/C6/C9-&lt;C/U/M/S&gt;&lt;5/6&gt;&lt;A/L&gt;</td>
</tr>
</tbody>
</table>

Example: IWO-C-U6A: overhead line sensor, short-range communication frequency is 470-510MHz, applicable to 60Hz 10KV power lines of North America and New Zealand.

## IWOS Concentrator - Pole-mounted / Line-mounted

|-------------------|---------------------------------------------------------------|---------|

Example: IWO-HD-FH20-C5B2: Concentrator, pole-mounted, supports Europe and Asia Pacific networks, short-range communication frequency is 470-510MHz, applicable to 50Hz 10KV power lines, packaged with 12Ah lead-acid battery, 20W solar panel.

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